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CLEAN VERSION

WALL CONSTRUCTION USING HOLLOW GLASS BUILDING ELEMENTS

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

5 The invention pertains to the field of building construction. More particularly, the invention pertains to walls with glass hollow tiles for buildings and as elements of the interior decoration.

DESCRIPTION OF RELATED ART

Units for erecting straight or arched walls with cubicoidal glass profiles, mainly hollow tiles, are known. Different types of units include vertical and horizontal
10 circumferential slats and horizontal supports with a length equal to the length of the wall as well as vertical supports with a length equal to the height of the hollow tiles. These supports have the form of bars or ladders constituting reinforcement elements. In the case of erecting arched walls, both circumferential slats and horizontal supports are adequately profiled in the prior art to match the wall contour, or reinforcing supports are placed in
15 horizontal and vertical gaps between hollow tiles. Such reinforcing supports are typically filled with construction mortar starting from the lower rows, on which the successive rows of hollow tiles are being put. Introducing ends of supports into profiled circumferential slats is also known in the art.

Units for erection of straight walls without the use of mortar, being elements of the
20 interior decoration of an erected building with the application of glass hollow tiles, are also known. The glass hollow tiles embrace the supporting elements, which are made of timber. Such units include a frame, horizontal slats with a length equal to the length of the wall and fixed to the frame with catches, and vertical supports with a length equal to the height of the hollow tile. The slats fill in horizontal joints between rows of hollow tiles,
25 whereas the vertical supports fill in vertical joints between individual hollow tiles situated in each row. Supports tightened between the slats have their lateral side either flat or convex, adjusted to the concave contour of lateral walls of the hollow tile.

SUMMARY OF THE INVENTION

The construction unit for use in erecting both flat and arched profiled walls consists of supporting elements including the horizontal and vertical supports in the form of joined blocks, which on their frontal sides are provided with longitudinal recesses with mortises. On their lateral sides, the vertical supports are provided with transverse holes overlapping with the recesses of the horizontal supports. In these holes and recesses, the threaded fasteners combining the entire construction are mounted. The longitudinal recesses may be given the form of grooved recesses. On both external sides of the construction unit, profiled slats are preferably fixed to the horizontal and vertical supports. The edges of the profiled slats are somewhat advanced outside the lateral edges of these supports. The threaded fastener is preferably a stud-bolt and a longitudinal nut co-operating with it. Preferably, the horizontal support has a length (a) equal to the length (b) of the glass hollow tile. The transverse holes of the vertical support are situated at a distance (s) from an end of the vertical support equal to the sum of a half of height (h) of the hollow tile and a half of thickness (d) of the horizontal support. To construct arched pro-filed walls, the unit is provided with distance pads in the form of tongues, mounted in front of the convex section between the side surfaces of the vertical support and the frontal surfaces of the horizontal support.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a top perspective view of a construction unit with glass hollow tiles in the fragment of a straight wall.

Fig. 2 shows the construction unit of Fig. 1 without the glass hollow tiles.

Fig. 3 shows a top perspective view of a construction unit with glass hollow tiles in the fragment of an arched profiled wall.

Fig. 4 shows the construction unit of Fig. 3 without the glass hollow tiles.

Fig. 5 shows a longitudinal section of a horizontal support of the unit.

Fig. 6 shows a front side view of the horizontal support of Fig. 5.

Fig. 7 shows a side perspective view of a horizontal support.

Fig. 8 shows a longitudinal section of a vertical support of the unit.

Fig. 9 shows the vertical support of Fig. 8 in a longitudinal section along line A-A line of Fig. 8.

5 Fig. 10 shows a side perspective view of a basic vertical support.

Fig. 11 shows a top perspective view of a short vertical support.

Fig. 12 shows a longitudinal section of a disassembled threaded fastener.

Fig. 13 shows an inside view of a profiled slat.

Fig. 14 shows a longitudinal section of the slat of Fig. 13.

10 Fig. 15 shows a longitudinal section of a horizontal support joining with vertical supports in a fragment of a straight wall.

Fig. 16 shows a top view of a vertical support joining with horizontal supports in a fragment of a profiled arched wall.

15 Fig. 17 shows an exploded view of the unit construction elements along with a glass hollow tile in another embodiment of the present invention.

Fig. 18 shows a side view of the grooved recesses of the horizontal support of the unit of Fig. 17.

Fig. 19 shows the horizontal support of Fig. 18 in a front side view along direction W of Fig. 18.

20 Fig. 20 shows a side view of the grooved recesses of the vertical support of the unit of Fig. 17.

Fig. 21 shows the vertical support of Fig. 20 in a front side view along direction W1 of Fig. 20.

Fig. 22 shows a horizontal section view of a horizontal support joining with vertical supports of Fig. 17 in a fragment of a straight wall.

DETAILED DESCRIPTION OF THE INVENTION

A construction unit for non-mortar erection of building walls was designed according to the present invention. This unit consists of supporting elements having a rectangular profile and embracing glass hollow tiles that constitute horizontal and vertical supports in the form of joining blocks. These supports have longitudinal recesses with mortises on their frontal sides. The recesses may be formed as holes or in the shape of grooved recesses. In the lateral sides of the vertical supports there are transverse holes overlapping with the recesses in the horizontal supports, in which threaded fasteners are mounted. Profiled slats are fixed to both external sides of the horizontal and vertical supports. The edges of the profiled slats extend somewhat outside the lateral edges of these supports. The profiled slats are fixed to the horizontal and vertical supports by means of tongue-and-groove joints. The threaded fasteners are composed of stud-bolts and longitudinal nuts cooperating with the stud-bolts. The horizontal supports have a length preferably equal to the length of the glass hollow tile. Transverse holes are situated in the vertical support at a distance from an end of the vertical support equal to the sum of a half height of the hollow tile and a half thickness of the horizontal support. The horizontal support and the vertical support contact each other after the assembly.

In order to construct arched profiled walls, the unit is provided with distance pads, in the form of tongues, mounted in front of the convex section of the wall between side surfaces of the vertical supports and frontal surfaces of the horizontal supports.

The construction unit according to the invention enables easy assembly of both straight and arched profiled walls of buildings or of their fragments with the application of various construction materials including timber, ensuring, on the one hand, the appropriate stability and tightness of the whole construction, and, on the other hand, guaranteeing the high aesthetic qualities associated with the possibility to functionally operate the light in the interior decoration by means of the adequate selection of glass hollow tiles.

Referring to Fig.1 through Fig. 16, a construction unit according to the invention is provided with horizontal and vertical supports 1, 2 in the form of joining blocks having a rectangular or near-rectangular shape and serving as the supporting elements to which profiled sealing slats 3 are fixed. The supports and slats compose together a rigid framing for all glass hollow tiles, which form the glazing of construction facilities.

The supports 1, 2, preferably of the same thickness d , are joined together with the threaded fasteners consisting of stud-bolts 4 and longitudinal nuts 5 cooperating with them. These nuts are also the joints used to fasten together the stud-bolts. The stud-bolts directly fastening the vertical supports together have a length that is adequately adjusted to the length of these supports. On the other hand, the stud-bolts fastening together the horizontal supports, which are separated by the vertical supports, have a length adequately adjusted to the length of the horizontal supports and to the thickness of the vertical supports.

Glass hollow tiles of the luxfer type have external walls of a rectangular shape. The upper, lower, and side walls forming the circumference of the hollow tile have concave surfaces in their central sections. The horizontal support 1, having a length a , preferably equal to the length b of the glass hollow tile and a width slightly less than the thickness of this tile, has at least one, and preferably two, longitudinal recesses 7 for stud-bolts 4. These recesses are broadened at one side and form recesses 8 for thrust washers 9 and mortises 10 for the nuts 5. In the external sides of the horizontal support through the whole length of the horizontal support, recesses are made, forming grooves 11 preferably of a trapezoidal shape.

The vertical support 2 has at least one longitudinal recess 12 made in it for the stud-bolt 4, which is situated lengthwise along the vertical axis of symmetry, which is broadened at one side, and which forms a recess 8 for a thrust washer 9 and a mortise 10 for a nut 5. Additionally, grooves 11 are formed in the external sides on the whole length of the vertical support 2.

Long basic vertical supports as shown in the Fig. 8, preferably have a length which is the sum of the hollow tile height h and the horizontal support thickness d . The basic

vertical supports have transverse holes 13 in their central section that overlap with the longitudinal recesses of the horizontal supports in the assembly.

Additionally, short vertical supports, forming the side framing of the first and the last layer of the hollow tiles in creating the wall, have a length preferably equal to the sum of a half height h of the hollow tile and the thickness d of the horizontal support. The transverse holes 13 are made at the bottom of the short vertical support, as shown in Fig. 11. The transverse holes of the basic and short vertical supports 2 are situated in relation to the frontal surfaces 25 at a distance s from an end of the vertical support being equal to the sum of a half height h of the hollow tile and a half of thickness d of the horizontal support.

The profiled slats 3, having a width slightly greater than the thickness of the horizontal and vertical supports 1, 2 and a length adjusted adequately to the lengths of these supports, have a tongue 14 on their inner side. The shape of the tongues 14 is adjusted to the shape of the grooves 11 made in the supports, to which they are fastened by means of a front tongue-and-groove joint 15.

The transverse section of the profiled slats has a polygonal contour with step-shaped edges 16, which are advanced a little bit outside the side edges 17, 18 of the supports and reach above the outside edges 19 of the hollow tiles, which stiffens and also seals the joints formed between the hollow tiles.

For construction units of the present invention for erecting profiled walls with a shape approximate to arch, the horizontal supports include enlarged longitudinal passage recesses 7 in order to adequately position the stud-bolts 4 during the assembly. These units are additionally provided with distance pads 20 in the form of tongues with a near-rectangular section, which, as shown in Fig. 16 during the assembly of the support, are placed in front of the convexly profiled section of the wall, between the side surfaces 21 of the vertical support and the frontal surfaces 22 of the horizontal support, as well as the side walls of the glass hollow tile.

Preferably, the horizontal supports have rectangular recesses 23 on their front sides for mounting the distance pads into them. Such a construction ensures an adequate angular positioning of the supports 1, 2 in relation to each other such that the intended wall

profiles are erected, in principle without any strain on the threaded fasteners, which ensures the necessary stability of the wall shape. The proper profiles of walls with lower or greater convexity can be obtained by adjusting the thickness of the pads 20. Such a construction solution simplifies the assembly and construction of various profiles without the necessity to form specialized horizontal supports in order to form a suitable shape of the frontal sections.

When the free-standing walls are erected inside a building, the external supports are replaced or additionally reinforced with the frame, which is formed from the vertical and horizontal uniform elements 24 having the shape of straps, which are fastened by means of known metal fasteners. Short bolts may be mounted on the frame, the dimensions of which are adjusted to the longitudinal nuts 5 to which the stud-bolts 4 are fastened. In the case of arched walls, the shape of the frame base is adjusted to the profile of the erected wall.

The horizontal and vertical supports may have, according to the recesses on their circumference, adequately profiled surfaces as indicated by the broken lines in Figs. 6 and 9, which minimizes the possibility to form gaps in the wall structure.

In the case of constructing window openings and, generally, in the case of erecting external walls, gaps occurring between hollow tiles and supports may be filled with a flexible sealing compound.

A construction unit embracing a single glass hollow tile in principle includes two horizontal supports (the upper and the lower one), four vertical supports (two on each side) and eight threaded fasteners. The eight threaded fasteners are mounted in the longitudinal recesses 7, 12. The number of elements is selected depending on the number of glass hollow tiles to be used in the erected wall. A suitable location of the transverse holes 13 of the vertical support is such that the vertical supports meet each other after assembly with their frontal surfaces 25 at the height complying with the central section of the hollow tile. The parts of the vertical supports that are pulled outside their horizontal edges form the arms embracing the hollow tile situated within the adjacent layer of the wall up to its half dimension.

The sections of the support that are advanced upwards facilitate the even laying of hollow tiles and the assembly of the next layer. This ensures straight wall construction and guarantees a suitable stiffness and stability for the whole construction.

In another embodiment of the construction unit, as shown in Fig. 17 through Fig. 22, the longitudinal recesses 7 along with the mortises 10 of the horizontal supports 1 have the form of grooved recesses 7a with mortises 10a. The longitudinal recesses 12, along with the mortises 10, of the vertical supports 2 have the form of the grooved recesses 12a with the mortises 10a. Moreover, such grooved recesses are made through the whole length of the supports. The recesses 8a, in front of the mortises 10a for mounting the nuts 5, are for mounting the thrust washers 9. The recesses 7a, 12a of the horizontal and vertical supports are provided with cuboidal grooves of a width slightly exceeding the diameter of the stud-bolt 4 of the threaded fastener, and they are terminated with the bottom 26 having an arched surface adjusted to the oval shape of the stud-bolt. The bottom of the recess is made at a depth such that longitudinal and centric positioning of the stud-bolt is enabled. The axis of symmetry of the recess runs at a depth approximately equal to a half of thickness of the supports 1, 2.

From a technological point of view, irrespective of the length of the horizontal and vertical supports, a high precision is reached on the hole in mapping the grooved recess shapes, such as when using milling techniques. On the one hand, this guarantees the even, straight laying of a stable wall, and, on the other hand, it facilitates the upward assembly of the wall due to the elimination of any prior twisting of the threaded fasteners when putting on the block supports. In order to ensure the appropriate stiffness of the wall during the upward assembly of the vertical supports, each vertical supports is reversed in relation to the vertical supports that are laid above and below it by an angle of 180°. Thus, the side opening of the recess 12a of the vertical support is situated alternately on the left and on the right side of posts constituting the supporting construction made of the vertical supports. The horizontal supports, vertical supports, profiled slats, and distance pads are made of timber, plastic, or other construction materials with suitable resistance parameters. Adequately selected materials, such as those made of timber, ensure high aesthetic qualities of the walls in creating a decorative element in building facilities.

The construction units according to the invention make it possible to erect, with the application of glass hollow tiles, partition walls, external walls, and other free-standing decorative screens of large sizes, enabling functional operation of the light subject with the adequate selection of glass hollow tiles. The unit characterised in the construction makes it possible to assemble both straight and arched profiled walls by oneself.